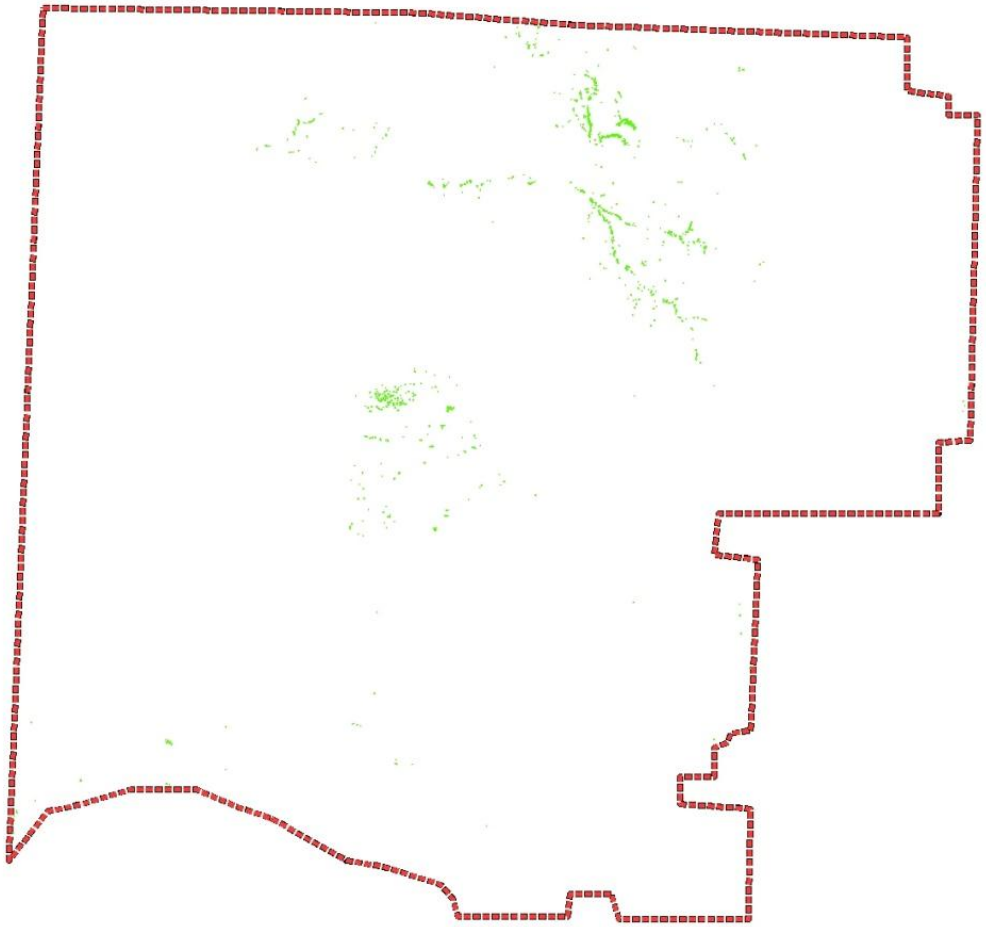
RIPARIAN – WETLAND

This cover type occupies 3,637 acres (less than one percent) of the BLM surface within the Farmington Field Office administrative area (Map 1). The soils in these areas are typically comprised of stratified sediments of varying textures that are subject to intermittent flooding and/or fluctuating water tables that may reach the surface. The duration of the soil-wetness feature is dependent upon the seasonal meteorological characteristics of the adjacent water body, or the subsurface water table.



Map 1. Riparian plant community on BLM lands within the FFO area.

In a healthy riparian system, four primary elements (soil, water, vegetation and landform/geology) are in balance and mutually support one another. Although all four elements are important, water and soil are the fundamental elements that define riparian areas, while vegetation reflects the nature and condition of the soil and moisture conditions. Plant communities in this system fluctuate widely across the site in response to routine disturbance but reestablish quickly in predictable patterns in relation to available water and depositional features. Vegetation is often the most controllable

element; it is usually the easiest to manipulate and generally responds most quickly to human influence, use and actions.

Plant community structure and function are determined largely by the hydrology of the system: depth to water table, frequency of flooding and ponding and the occasional complete alteration of the channel (channel position and function may be altered by flood events as the channel constantly seeks equilibrium with its flow regime and constraining landscape features). Flooding of the riparian zone affects soil chemistry by producing anaerobic conditions, importing and removing organic matter, and replenishing nutrients. The varying hydrology for active floodplains and one-hundred year floodplains result in different plant communities.

Active Floodplain

Species assemblages in the active floodplain are variable and more based upon seasonality of water and elevation rather than soil type, but generally include a cottonwood-willow dominated community. Shrubs and trees include willows (Coyote, Goodding's, Peachleaf, Bebbs, and other willows) cottonwood (Rio Grande and Narrow Leaf cottonwood), stretchberry (the native New Mexico olive), and invasive and non-natives Russian olive and tamarisk (saltcedar). Tree species diversity is low, however age class and structural diversity is high. Younger recruits are found closer to the active channel while older, more mature cottonwoods can be hundreds of yards from the active channel. The character of the understory is dependent on previous disturbances (i.e., fire, human disturbance, livestock grazing, flooding, etc.) but typically include forbs, grasses, and graminoids such as horsetail/rush, cattails, spikerush, sedges, rushes (in wet soil areas), sunflowers, Rocky Mountain beeplant, saltgrass, scratchgrass (alkali muhly), reed canarygrass; invasive non-natives Russian thistle, Russian knapweed or other knapweed species, and downy brome (cheatgrass) may be present in disturbed sites.

One Hundred Year Floodplain

Species assemblages in the one-hundred year floodplain are generally more associated with Blancot or Notal soil types and support a more grass dominated community, but can include shrubs and trees. The species found are those that are tolerant of drier conditions yet have a root structure capable of withstanding infrequent high flow events. Species may include willows (Coyote, Peachleaf, Bebbs, and other willows) cottonwood (Rio Grande and Narrow Leaf cottonwood); stretchberry (the native New Mexico olive), invasive and non-native Russian olive and tamarisk (saltcedar). Graminoids include spikerush, sedges, rushes (in wetter low-lying areas in the floodplain); other grasses and forbs include scratchgrass (alkali muhly), alkali sacaton, spike dropseed, Indian ricegrass, giant dropseed, sand dropseed, reed canarygrass, Rocky Mountain beeplant, lupine, evening primrose, buckwheat, Indian paintbrush, and hoary tansyaster. In disturbed sites invasive/non-native downy brome (cheatgrass), Russian thistle and Russian knapweed or other knapweed species may be present. In dryer portions of the floodplain, native shrubs rubber rabbit brush, big sagebrush, skunkbush, black greasewood, and four-wing saltbush can be found.

Table 1. Reclamation Goals for Riparian-Wetland Community - Active Floodplain

Functional Group	*Percent % Foliar Cover*	*Common species*
Trees/Shrubs/Graminoids/Forbs	≥40	Cottonwood spp.,Willow spp., various rushes and sedges, alkali sacaton, Indian ricegrass, giant dropseed, sand dropseed, spike dropseed, inland saltgrass, scratch grass
Invasive/undesirables **10% allowed toward meeting standard of 40%.**	≤10	Plants that have the potential to become a dominant species on a site where its presence is a detriment to revegetation efforts or the native plant community. Examples of invasive species include cheatgrass, Russian thistle, kochia.

Table 2. Reclamation Goals for Riparian-Wetland Community - 100 Year Floodplain

Functional Group	*Percent % Foliar Cover*	*Common species*
Trees/Shrubs/Graminoids/Forbs	≥30	Cottonwood spp.,Willow spp., rubber rabbitbrush, black greasewood, big sagebrush, skunkbush; alkali sacaton, Indian ricegrass, giant dropseed, sand dropseed, spike dropseed, scratch grass
Invasive/undesirables **10% allowed toward meeting standard of 30%.**	≤10	Plants that have the potential to become a dominant species on a site where its presence is a detriment to revegetation efforts or the native plant community. Examples of invasive species include cheatgrass, Russian thistle, kochia.

NOTE: The FFO 2003 RMP defines mitigation measures for surface disturbance within riparian areas:

> "When riparian vegetation cannot be avoided during permitted project, the permittee is responsible to reestablish any riparian vegetation lost during construction. Cottonwoods will be replaced on a 10 to 1 ratio and willows will be replaced on a 3 to 1 ratio."

Projects which impact riparian areas will be handled on a case-by-case basis, but may include planting/reclamation requirements comprised of the following:

Table 3. Menu based seed mix for reclamation for riparian-wetland community - Active Floodplain (minimum requirement)**

Common Name	*Scientific Names*	*Variety*	*Season*	*Form*	*PLS lbs/acre**
Plant two of the following:					
Inland saltgrass	*Distichlis spicata*	LK517f	Warm	Sod-forming	6.0
Alkali sacaton	*Sporobolus airoides*	VNS	Warm	Bunch	0.25
Sand dropseed	*Sporobolus cryptandrus*	VNS	Warm	Bunch	0.5
And two of the following:					
Indian ricegrass	*Achnatherum hymenoides*	Paloma or Rimrock	Cool	Bunch	4.0
Bottle brush squirreltail	*Elymus elymoides*	Tusas or VNS	Cool	Bunch	4.0
Western wheatgrass	*Pascopyrum smithii*	Arriba	Cool	Bunch	4.0
Adjust if necessary to make a total of no less than 10 PLS lbs/acre					
And if soil salinity is less than 4 mmhos cm -1, plant the following:					
Rio Grande cottonwood	*Populus deltoides ssp. wislizeni*	Native Pole		Tree	20 ft. Grid
Coyote willow	*Salix exigua*	Native Whip		Small tree to shrub	2.5 ft. Grid
Goodding's willow	*Salix gooddingii*	Native Whip		Small tree to shrub	2.5 ft. Grid
[1]Narrow-leaf cottonwood	*Populus angustifolia*	Native Pole		Tree	20 ft. Grid
[1]Bebb's willow	*Salix bebbiana*	Native Whip		Small tree to shrub	2.5 ft. Grid
[1]Peach-leaf willow	*Salix amygdaloides*	Native Whip		Small tree to shrub	2.5 ft. Grid

[1] These species are recommended for higher elevations.

****Based on 60 pure live seeds (PLS) per square foot, drill seeded. Double this rate (120 PLS per square foot) if broadcast or hydroseeded.**

VNS = Variety Not Specified

NOTE: The FFO 2003 RMP defines mitigation measures for surface disturbance within riparian areas:

"When riparian vegetation cannot be avoided during permitted project, the permittee is responsible to reestablish any riparian vegetation lost during construction. Cottonwoods will be replaced on a 10 to 1 ratio and willows will be replaced on a 3 to 1 ratio."

Projects which impact riparian areas will be handled on a case-by-case basis, but may include planting/reclamation requirements comprised of the following

Table 4. Menu based seed mix for use in reclamation for riparian-wetland community - 100 Year Floodplain (minimum requirement)**

Common Name	*Scientific Names*	*Variety*	*Season*	*Form*	*PLS lbs/acre**
Plant three of the following:					
Alkali sacaton	*Sporobolus airoides*	VNS	Warm	Bunch	0.25
Sand dropseed	*Sporobolus cryptandrus*	VNS	Warm	Bunch	0.5
Indian ricegrass	*Achnatherum hymenoides*	Paloma or Rimrock	Cool	Bunch	4.0
Western wheatgrass	*Pascopyrum smithii*	Arriba	Cool	Bunch	4.0
Bottle brush squirreltail	*Elymus elymoides*	Tusas or VNS	Cool	Bunch	4.0
And one of the following:					
Blue grama	*Bouteloua gracilis*	Alma or Hachita	Warm	Sod	2.0
Galleta	*Pleuraphis jamesii*	Viva florets	Warm	Bunch/Sod-forming	3.0
Adjust if necessary to make a total of no less than 10 PLS lbs/acre					
If trees are present and impacted in the 100 Year Floodplain *And* if soil salinity is less than 4 mmhos cm -1, plant the following:					
Rio Grande cottonwood	*Populus deltoides ssp. wislizeni*	Native Pole		Tree	20 ft. Grid
Coyote willow	*Salix exigua*	Native Whip		Small tree to shrub	2.5 ft. Grid
Goodding's willow	*Salix gooddingii*	Native Whip		Small tree to shrub	2.5 ft. Grid
[1]Narrow-leaf cottonwood	*Populus angustifolia*	Native Pole		Tree	20 ft. Grid
[1]Bebb's willow	*Salix bebbiana*	Native Whip		Small tree to shrub	2.5 ft. Grid
[1]Peach-leaf willow	*Salix amygdaloides*	Native Whip		Small tree to shrub	2.5 ft. Grid

[1] These species are recommended for higher elevations.

****Based on 60 pure live seeds (PLS) per square foot, drill seeded. Double this rate (120 PLS per square foot) if broadcast or hydroseeded.**

VNS = Variety Not Specified

Photo 1. Riparian system in the FFO with a mix of grasses, shrubs and trees.

Photo 2. Riparian system in the FFO dominated by graminoids and no trees.

Photo 3. Riparian system in the FFO dominated by shrubs.

RECOMMENDATION FOR EFFECTIVE RECLAMATION

Recommendations: Provided below are some procedures and methods that may to help achieve more effective reclamation success.

Soil Testing: Development of a soil testing plan for evaluation of the results of topsoil handling and reclamation procedures related to revegetation may prove beneficial. Suggested soil testing may include some or all of the following: pH, electrical conductivity (EC), texture, topsoil depth and overall soil depth, carbonates (reactivity), organic matter (OM), Sodium Absorption Ratio (SAR).

Topsoil Stripping, Storage, and Replacement: At a minimum, the upper six (6) inches of topsoil should be stripped, following the removal of vegetation during construction of well pads, pipelines, roads, or other surface facilities. The stripped topsoil should be stored separately from subsoil or other excavated material and replaced prior to final seedbed preparation. Topsoil should not be used for blow pits or flaring areas.

Seedbed Preparation: For cut-and-fill slopes, initial seedbed preparation should consist of backfilling and recontouring to achieve the configuration specified in the reclamation plan. Seedbed preparation for compacted areas should be ripped to a minimum depth of eighteen (18) inches, with a maximum furrow spacing of two (2) feet. Where practicable, ripping should be conducted in two passes at perpendicular directions. **Avoid leaving large clumps or clods**. If this exists, disking should be conducted. Disking and seed drills should run perpendicular to slopes to provide terracing and prevent rapid runoff and erosion.

Seedbed preparation is one of the most important steps for reclamation success. Following final contouring, the backfilled or ripped surfaces should be covered evenly with topsoil. Final seedbed preparation should consist of raking or harrowing the spread topsoil prior to seeding to promote a firm seedbed. **A loose seedbed makes it impossible to control the depth of seeding because the tires and the planter sink into the soil.** Seedbed preparation may not be necessary for topsoil storage piles or other areas of temporary seeding.

Planting Depth: **Improper planting depth, particularly the planting of some species too deeply, in "fluffy" soils, is one of the major impediments to reseeding success.** The Truax seed drill or modified rangeland drills that allows for seeding species from different seed boxes at different planting depths has been used by other BLM offices to address this issue. Efforts should be taken to ensure that perennial grasses and shrubs are planted at the appropriate depth. Intermediate size seeds such as wheatgrasses and shrubs should be planted at a depth of 0.5 inches, larger seeds such as Indian ricegrass at 1 to 2 inches, and small seeds such as alkali sacaton, and sand dropseed should be planted at a depth of 0.25 inches. In situations where differing planting depths are not practicable with the equipment being used, the entire mix should be planted no deeper than 0.25 inch. Planting too shallow is generally better than planting too deep. **A review of current**

research methods is recommended (e.g., USDA PLANTS, USDA Plant Materials Centers, Native Seed Companies).

Soil Amendments: Amending a soil is not the same thing as mulching, although many types of mulch also are used as amendments. A "soil amendment" is any material added to a soil to improve its physical properties, such as water retention, permeability, water infiltration, drainage, aeration, nutrition and structure. Organic amendments include sphagnum peat, humate, wood chips, grass clippings, straw, compost, manure, biosolids, sawdust and wood ash. Inorganic amendments include vermiculite, perlite, lime, gypsum, tire chunks, pea gravel and sand.

Mulching: Mulch may increase the success of seed germination and provide protection against erosion. Mulch should be applied within 24 hours following completion of seeding. In areas of interim reclamation that used drill-seeding or broadcast-seeding/raking, mulch shall consist of crimping certified weed-free straw or certified weed-free native grass hay into the soil. Hydromulching may be used in areas of interim reclamation where crimping is impracticable, in areas of interim reclamation that were hydroseeded, and in areas of temporary seeding regardless of seeding method. Mulch applications in extremely clayey soils should be evaluated carefully to avoid developing an adobe mixture. In these cases, a soil amendment may prove more beneficial.

Timing of Seeding: Precipitation is the principal input controlling biological processes in arid and semiarid regions. The pattern of soil moisture will have a great impact on the fate of seeding. Many grasses species will germinate following significant moisture events that allow for deeper infiltration of soil moisture (4-12 inches deep). This moisture generally persists for several weeks and is available for seedling root growth and establishment.

Grass species belong to one of two basic physiological types; cool season or warm season. Cool season grasses have optimum growth temperatures of 70-75°F with growth halting at around 40°F. Warm season optimum temperatures occur at 85-95°F and growth ceasing at about 55°F. The best time for seeding grass is at the beginning of the growing season. For cool season grasses, there are two growing cycles: FALL and SPRING. The best time to plant cool season grasses is in late summer or early fall. For warm season grasses, there is 1 growing season: SUMMER. The best time plant warm season grass species is early spring or summer, with the onset of the monsoons, typically beginning in early to mid-July.

The paragraph above provides the optimal timings of seeding for cool and warm season species which make up the seed mixes for of the eight desired plant communities for reclaiming disturbed areas. Experience in Farmington Field Office has shown with adequate winter moisture seeds planted in the late fall or early winter (before the ground is frozen), that cool season species will germinate the following spring, setting the stage for germination of warm season species in the mix later in the season.

Additional Seeding Rates or Species: While minimum seed requirements have been provided by the BLM, it does not exclude proposals for increased seeding rates or additional species/varieties of plants to BLM for approval to achieve reclamation standards. Industry attaining an understanding of soil types, precipitation patterns, the climate, and vegetation/environment relationships could be very valuable.

Sterile Cover Crop Option: Sterile cover crops can be useful in temporary site stabilization in the case where bare soil is exposed. It also can be used with the perennial mix in reclamation for a non-persistent "nurse" crop. A nurse crop is an annual crop used to assist in establishment of a perennial crop. Nurse crops reduce the incidence of weeds, prevent erosion, and shelter tender seedlings from sun and wind.

Other advantages are:

- Sterile annual plant; rapid germination (sprout rapidly, establish quickly)
- Plant will not persist past one growing season
- Cold tolerant, able to grow under cool conditions
- Larger root mass and more efficient use of soil nutrients than wheat; holds soil and builds soil organic matter
- Superior tolerance to disease, salt, and drought compared to wheat
- Able to adapt to a wide range of soil and moisture conditions
- Adapts either fall or spring plantings; has fair to excellent winter survival

Common Name	Scientific Names	Variety	Season	Form	PLS lbs/acre*
Sterile Cover Crop	*Triticum aestivum X Secale cereale*	Quickguard or similar sterile hybrid var.	Cool	Grass	7-10

***Based on 60 pure live seeds (PLS) per square foot, drill seeded. Double this rate (120 PLS per square foot) if broadcast or hydroseeded. Can be mixed with the perennial mix and seeded at the same time.**

BLM Consultation: BLM is available provide consultations concerning fencing options to help minimize industry costs, should fencing be necessary to achieve reclamation success.